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STRATEGIC DEPLOYMENT REQUIREMENTS FOR AN EXPEDITIONARY ARMY

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ABSTRACT

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What is our strategic reach? While many studies focus on the capacity of our Defense Transportation System to move troops and material, this research examines the national strategic capability to deploy and sustain forces to remote parts of the globe. Many potential and key trouble spots reside in land-locked countries or are far from established lines of communication. In the build up for OEF, force projection was often hampered by transportation constraints and especially aviation fuel. U.S. defense strategy is transitioning from a half-century of forward deployed forces towards a force based at home that is expeditionary in nature. Can the U.S. deploy Brigade Combat Teams over strategic distances without utilizing Intermediate Staging Bases? What are the primary constraints for deployment of forces into austere environments? What alternatives and future concepts exist to project and support our Expeditionary Army?

STRATEGIC DEPLOYMENT REQUIREMENTS FOR AN EXPEDITIONARY ARMY

> Over the coming decade, we'll deploy a more agile and more flexible force, which means more of our troops will be stationed and deployed from here at home. We'll move some of our troops and capabilities to new locations, so they can surge quickly to deal with unexpected threats. We'll take advantage of 21st century military technologies to rapidly deploy increased combat power.
>
> —President George W. Bush
> VFW Convention, 16 Aug 04

Having the greatest military force on the globe is meaningless if it can not be applied at the required point and place in time. The National Defense Strategy identifies this crucial requirement by stating, "the United States cannot influence that which it cannot reach."[1] As the United States continues to shift towards a CONUS based force while expanding its influence in the global environment, the ability for expeditionary forces to respond in accordance with our national interests is critical. The Global War on Terror has highlighted key challenges and capability gaps that must be addressed should this nation maintain not only its hegemonic autonomy, but its responsibility as the world's sole superpower.

The nation's military is transforming from a forward-based presence to an expeditionary force projected largely from the continent of North America. What does this expeditionary force need in terms of strategic lift to accomplish the mission in accordance with the National Military Strategy? This paper examines the requirements of an expeditionary Army, and what capabilities (vice capacity) must mobility forces possess to meet those needs.

Most mobility studies to date have focused on the capacity of available lift to execute major combat operations. The 1995 Mobility Requirements Studies (MRS) Bottom Up Review Update and later the MRS 2005 (MRS-05) zeroed in on the amount of lift necessary to meet the global force deployment requirements in terms of capacity needed to deploy forces. The 2006 Mobility Capabilities Study (MCS) broadened its analysis to limitations that infrastructure places on deployment flow re-examining needs and constraining factors when deploying to a theater of war. What must be studied in future work is the capability of the strategic mobility force to deploy and sustain forces outside established infrastructure and lines of communication, e.g. Operation Enduring Freedom in Afghanistan. In this case, capability is defined as what our strategic lift can physically move over a given time, given a host of realistic constraints. In order to realistically analyze strategic mobility needs, the capacity to lift a given number of short ton miles per day is not as important as the actual capability to move material and manpower

through a constrained pipeline. Most critical is the capability to deliver manpower and cargo to the intended destinations when it is needed.

As our military transforms for the 21st century, the general focus of effort gravitates toward platforms and weapons, often ignoring the complexities involved with their employment as a system. The ability "to respond rapidly to emerging crises and control escalation on our terms"[2] may be severely inhibited by factors within the deployment and transportation system as currently envisioned.

A critical aspect of expeditionary operations is agility... the ability to rapidly shift forces and efforts across the globe in order to apply force at the time and place of not only our choosing, but in time to affect the given situation. The United States currently does not appear to have the ability to deploy large formations from the continent of North America across the globe in only days or even weeks. Deployment analysis for a 4000 Soldier and 1000 vehicle Stryker Brigade Combat Team shows that even using the bulk of the 180 x C-17 Globemaster IIIs in the fleet, the brigade cannot deploy to the far reaches of the globe in 4 days as originally envisioned by then Chief of Staff GEN Eric Shinseki.[3] What systems are in place or on the horizon that enable an improvement to these response times, providing lift and combat capabilities?

It is fully recognized that the bulk of Army equipment moves via sealift in situations where seaports and access is available; some of those concepts and challenges will be addressed here. However, to narrow the focus on immediacy of forces, the focus of this paper lays primarily with the air mobility requirements for an Expeditionary Army.

The Emergence of an Expeditionary Force

The Berlin Airlift of 1948-1949 and later Operation Nickel Grass in 1973 showcased the ability of the United States to move massive amounts of material through the air over strategic distances. The Berlin Airlift supplied a city for nearly a year, while Nickel Grass delivered 22,325 tons of weapons and critical supplies over 33 days to Israel during the Yom Kippur War via C-141 Starlifter and C-5 Galaxy.[4]

For decades, the United States strategic focus was the defense of the European continent from Russian hordes during the Cold War. U.S. forces from the continent of North America would augment hundreds of thousands already pre-positioned to make a stand. With the end of the Cold War, the United States has struggled to define where, when, and how to best employ its forces across the globe. Movement of heavy mechanized forces poses a particular dilemma when planners are faced with speed versus combat power. Light forces provided a degree of strategic mobility for Operations Urgent Fury (1983) Just Cause (1989) and the initial phases of

Desert Shield (1990), but these operations can be characterized as mobility without significant combat power. To illustrate the pace of deployments, in the Air Force's first 40 years of existence, it participated in 10 joint deployments. From 1989 to 1999, as U.S. forces reduced forward presence and expanded its scope, there were 40 joint deployments in just one decade.[5]

The drawdown after the Cold War triggered not only a budgetary peace dividend, but facilitated the redeployment of forces from forward deployed locations abroad back to the continental United States. In order to maintain equivalent levels of global engagement, CONUS forces will have to deploy more frequently and over greater distances.[6] This shift in strategic orientation places a greater strain on our mobility forces and increases the effort to project power with an inherent risk that the deploying forces will not have sufficient time to build. This fundamental transformation from forward basing to reliance on force projection drives the Army to focus on an expeditionary requirement.

How is the expeditionary mission of the past century different from today? In both World Wars I and II, the U.S. was predominately a continental based force fighting global wars abroad after a 1-2 year build up and training period. Contrasting the first three-quarters of the 20th century, today we maintain a trained and ready standing Army and profess the ability to deploy globally. Today's expeditionary forces mitigate the training times of yore with vastly improved response times. The compressed timeline is also necessitated by the global media and ongoing information operations campaigns where time of inaction is now the enemy. Where we once had the luxury of months or years to react, today we have days and fleeting weeks.

Army Transformation addresses the needs to field lighter, more deployable formations as coherent packages, truly capable of dominant and rapid power projection, where employment equals deployment. These units must have sufficient power to execute operations across the broad spectrum of possible scenarios. Transformation coupled with basing forces in the continental U.S. drives the expeditionary requirement.

The last such rage in the military vernacular of the term "expeditionary" was in World War I, when General John Joseph "Black Jack" Pershing led the American Expeditionary Forces to fight German expansion in Europe as part of a French and British coalition. This deployment was America's first major projection of forces to the European continent. Today, the term expeditionary is bantered around as an end state condition by every branch of the service. Army Field Manual 1 states "Executing the National Military Strategy requires military forces with an *expeditionary capability*. It stresses fast, flexible power projection to eliminate threats before they reach the United States."[7] Army modular forces must possess the ability to promptly deploy combined arms forces across the globe, with an eye to sustaining the entire campaign in

order to achieve the specified end state. The continual challenge as we design forces is to reconcile the Army's combat power with its strategic agility — the ability to promptly deploy.[8] Much like the Marines, the Army must ensure that the term "expeditionary" isn't solely embedded in lexicon, but becomes the center of its very culture.

What is the Lift Requirement for an Expeditionary Force?

Erwin Rommel was quoted as saying that, "Any offensive should combine much speed and violence." Each and every expeditionary operation must combine these elements of speed and power to have a chance of success. Under Title 10, US Code, the Army's central responsibility is to conduct "prompt and sustained" operations on land in support of the joint force commander.[9] These two elements, "prompt and sustained" can often compete, but the Army must tailor its capabilities and future toward a force capable of rapid deployment with effective combat power while trying to minimize its logistics footprint. The Army of the 21st century must be capable of operational maneuver from strategic distances in order to deter and engage adversaries from a position of advantage.[10] Deploying too slowly with insufficient strength greatly increases the opportunities for conditions to degrade and potentially reduces options in support of national strategy.

One of the Air Force's core competencies is *rapid global mobility*, "the ability to rapidly position forces anywhere in the world."[11] The Navy and the Marine Corps capabilities are typically framed by the littorals and oceans, "to project precise power from the sea."[12] At the crux of the deployment shortfalls challenge is the dependence of the Army on the other services to get there quickly. While the other services can largely self deploy (Marines, Air Force, Navy), the Army is dependent on the Air Force lift for initial global force projection. It can be inferred that deploying the Army can conflict with other services' requirements to deploy, potentially challenging the Combatant Commander's force needs. Often attributed as a quote from Albert Einstein, "*nothing happens until something moves*" is also in the creed of the U.S. Army Transportation Corps. The statement highlights that employment of the world's premier Army as an effective expeditionary force is conditional on the capabilities of strategic lift.

The Department of Defense conducted two studies this century to examine the strategic lift requirements for U.S. forces given current war planning guidance. The first, the Mobility Requirements Study 2005 (MRS-05), focused on the needs to deploy forces from a peacetime baseline through the support of multiple conflicts. MRS-05 identified particular lift shortfalls, and was subsequently followed by the Mobility Capabilities Study 2006 which re-examined lift

requirements with an eye towards baseline requirements and evolving strategic guidance. Both of these studies are examined more in-depth below.

MRS-05 identified a minimum airlift capacity for critical cargo and passenger requirements to support two Major Theaters of War (MTW). MRS-05 recommended an airlift fleet capable of 54.5 Million Ton Miles per Day (MTM/D).[13] The MTM/D metric focuses on the *capacity* of the available military and civilian air fleet to move cargo over given distances in one day. For example, a C-17 could fly 40 Tons 6,000 miles in one day, contributing 240,000 Ton Miles per Day to the overall capacity. While this MTM/D metric includes airplanes returning empty to points of origin, it does not fully encompass other limiting factors. Also noted in MRS-05 is the requirement to conduct a Strategic Brigade Airdrop (SBA). In order to deconflict the massive requirements for an SBA, the operation is planned not to coincide with peak demand of deployment.

The Mobility Capabilities Study (MCS), released in February of 2006, examined the two overlapping MTW requirement from MRS-05. The study defined mobility as the "deployment, sustainment, and redeployment…encompassing aerial refueling and infrastructure" to support Defense Strategy.[14] Capacity studies that preceded the MCS focused on sustained and maximum surge lift needs (peak demand) to support the warfight. The MCS found current lift capacities sufficient to meet U.S. objectives with an acceptable amount of risk.[15] In most scenarios, the constraints are due to infrastructure and throughput, *not* the number of available airframes. It is worth noting that several of the MCS analytic assumptions highlight additional risk; primarily that DOD will provide required funding for pre-positioning stock, infrastructure and overseas basing costs.[16]

MRS-05 and the MCS feature the need to support traditional MTW scenarios. The MCS bottom line determined that "overseas infrastructure, not the number of available aircraft, remains the fundamental constraint"[17] for large scale deployment of forces. Also for consideration are the requirements and agility needed outside the traditional scenarios for strategic locations with limited enroute infrastructure. Our recent experiences in Afghanistan provide a poignant lesson that we must have the capability to deploy and fight in nonstandard austere locales as well.

The Capstone Concept for Joint Operations (version 2.0) articulates eleven characteristics of the joint force operating in the expected future. Three of the eleven equate directly to the strategic needs in deployment of forces: expeditionary, fast and agile.[18] Effective expeditionary operations in the 21st century will be characterized by fast employment of forces. The key tenets for effective deployment of expeditionary forces require a system of platforms and

infrastructure, accessibility to relevant airspace, and a complete *capability* to move that force. A continuous struggle for the Army, is that lift assets required for their movement are predominately funded via the Navy and Air Force budgets which the Army often has little direct influence.

Army Field Manual 3-0, Operations, lays out the five tenants of Army Operations: Initiative, Agility, Depth, Versatility and Synchronization.[19] If viewed strategically rather than tactically, these all demonstrate the dependence of the Army on strategic lift.

The 2005 Army Strategic Planning Guidance articulates the Army requirements for force projection under three different strategic objectives that better quantify "rapid" in terms of force deployment. By executing prompt response, tailored land forces conduct decisive operations immediately to deter or defeat adversaries.[20] The Army must be prepared to simultaneously support two major combat operations less than 30 days apart in accordance with the 10-30-30 construct.[21] This construct is defined as: to seize the initiative within 10 days of the start of an offensive, achieve limited military objectives within 30 days, and be prepared within 30 days to shift resources to a second conflict. Additionally, the Army must provide power projection infrastructure capable of meeting the throughput needs to simultaneously support two MTW less than 30 days apart.[22]

The Army established a deployment framework in the Army Campaign Plan for Transformation in order to meet the 2006 Quadrennial Defense Review (QDR) guidance of 10 days to seize the initiative through quick response and an initial 30 day goal to defeat the enemy.[23] This established the following goals for deployment of formations synonymous with the Joint Swiftness Objectives (10-30-30).

- 4-7 days to deploy a Brigade Combat Team (BCT)
- 10 days to deploy a 3 x BCT division
- 20 days to deploy 9 x BCTs (a 3 division force equivalent)
- 30 days to deploy up to 15 x BCTs (5 division equivalent)

The Air Force also has deployment goals associated with its Aerospace Expeditionary Forces (AEF). Each AEF includes approximately 175 aircraft, 20 thousand personnel and 6,000 short tons of equipment that the Air Force wants to deploy within 48 hours and move up to 5 AEF's in 15 days.[24] As each service builds forces with expeditionary ambitions, the joint warfighter realizes the services compete for the very same strategic lift platforms that are limited by many of the same chokepoints. The net effect on airlift for the service's plans to transform as leaner, lighter, and more deployable packages will likely require additional analysis of strategic lift needs in the very near future.

Challenges to Power Projection

The effectiveness of our expeditionary forces will initially be established by our capability to project power and sustain those forces. The major challenge is to overcome the raw physics of moving mass, but we do so in distant locales where adversaries will seek to deny us access. We must maintain deployment flexibility at home and abroad, effectively secure our bases, and maintain access to the strategic commons.[25]

Future adversaries will actively seek to deny, delay, or disrupt US access through anti-access and area denial (A2/AD) capabilities.[26] Expeditionary forces in this case are especially vulnerable to asymmetric attacks on its lines of communications. Opposed deployments may become the established norm should future enemies learn from Iraqi mistakes of twice allowing U.S. forces time to build on its borders.[27] Critical large aerial and sea ports of debarkation could be crippled by effective use of ballistic or cruise missiles, saturation attacks, with or without introduction of Weapons of Mass Effect. The vulnerability of the U.S. force projection needs is especially tenuous as we increase dependency on foreign bases to operate.

US forces will have to achieve a level of deployment momentum [28] to overcome enemy anti-access efforts. The Army must rely on strategic mobility that is capable of delivering forces into austere environments and unimproved ports of entry. These mobility forces must be able to effectively disperse through multiple ports of entry as well as continually sustain those forces in order to avoid targeting by enemy A2/AD.[29]

In order to begin the Operation Enduring Freedom bombing campaign as quickly as possible after 9-11, several conditions had to be established for those first bombs. An early prerequisite was the Air Force needed search and rescue (SAR) capability should a bomber be shot down. This required emplacing MC-130 and SAR helicopters into neighboring Uzbekistan that could then range Afghanistan. These SAR aircraft could not launch until sufficient fuel was in-place on the ground for operations. Even though Karshi Khanabad airfield supported Uzbeki Mig fighters, additional fuel had to be flown in and downloaded into bladders. As KC-135s or KC-10's cannot land with a full load of fuel (too heavy), C-17s were uploaded with 5,000 gallon fuel bladders to download on the airfield. This entire operation contributed to a delay in the bombing campaign by as much as two weeks.[30]

As U.S. military presence stretches across the globe, challenges abound for airlift due to increased dependence on diplomatic clearances and fettered access to the global commons, particularly in regions of instability and within land locked areas. Projecting forces to conduct operational maneuver over strategic distances with the capability for immediate employment upon arrival has many challenges in execution.

Key Shortfalls in the Current Mobility Force

One of the Army's key Mission Essential Tasks (METL) is to conduct forcible entry operations.[31] These operations can be amphibious, air assault (helicopter) or airborne assault. This key expeditionary mission of the Army to conduct forced entry underscores the need for the Army to depend on U.S. Transportation Command (USTRANSCOM) to conduct the strategic legs of transportation to the area of operations. Specifically for this case, the Air Mobility Command has the requirement to "airdrop a brigade-size force over strategic distances and sustain combat forces by aerial delivery or airland operations."[32]

The airborne brigade combat team force is the lead element of our Army's strategic forced-entry power projection capability. While the March of 2003 insertion of the 173rd Airborne Brigade into Northern Iraq is seen as a validation of the C-17, several issues must caveat this heroic feat. The initial operation for the first night included only 15 C-17s, far short of the numbers envisioned for dropping an entire brigade and its equipment. Operations at the Aerial Port of Embarkation (APOE) were severely restricted by the Maximum on Ground (MOG) available for the C-17 on Aviano Airbase, Italy. A majority of the airframes had to line up tail-to-nose on the taxiway for loading. Operations were further restricted by the ability to conduct in-flight refueling for an aircraft formation of that size. The entire operation into Northern Iraq took 62 C-17 sorties and five nights to deliver 2,175 passengers and 3,060 short tons of cargo with 408 vehicles. In contrast to this monumental feat, the stated objective of deploying a Strategic Brigade Airdrop (SBA) is all forces on the ground in 30 minutes[33], requiring a total of 99 x C-17s.[34]

Effective deployment of expeditionary forces is not only constrained by the capacity of too few platforms. The ability to move forces is more often limited by too few airfields and ports as well as inadequate airfield infrastructure.

Infrastructure Constraints

In 1999, Task Force Hawk, equivalent to two Brigade Combat Teams with 7,745 passengers and 22,937 short tons of cargo required almost a month to deploy from Germany to Albania. The movement required 442 C-17 sorties but demonstrated the severe constraints placed on deployments when MOG limited operations at Rinas Airport to just two C-17s at a time[35], "there were not enough air bases in the area immediately around Kosovo to support all the aircraft…"[36] This example of power projection shows that limited infrastructure and too few airfields in the area of operations becomes the primary limiting factor to throughput which cannot be overcome by simply flying more sorties. A Military Traffic Management Command [37]

study found that the Army's deployment goals are most often hampered by limited infrastructure at forward airfields.[38] This is a particularly poignant finding in that Balkan operations are supported by many of the same air bases as need for operational support in Southwest and Central Asia as well as Eastern Europe. The airflow problem into austere (but expected) environments has been likened to a hose with a four-foot opening at one end and a four inch nozzle at the other end.[39] Given that virtually every deployment has midpoint and endpoint constraints restricting throughput, future defense visionaries must concentrate on making the far end of the pipe wide enough to meet our deployment requirements. If and when infrastructure becomes the bottleneck to that pipe, forcing more lift platforms into the force flow can not improve the rate of cargo delivery.

During the deployment for Enduring Freedom, Intermediate Staging Bases (ISB) along two divergent air bridges both limited the deployment.[40] Flight delays at fueling stations often occurred due to maintenance, contributing to saturated ramp space and straining infrastructure.[41] Resultant chain reactions overloaded ISBs on both air bridges and slowed the flow of forces and equipment to the fight.[42] To compound the problem, transload operations from C-5s and B747s to C-17 and C-130 threw off the deployment schedule and hampered airbase capacity. Even with two air bridges to support a single operation, infrastructure constraints restricted throughput and the number of available C-17s and crews did not prove to be the limiter.

Fuel as a Restrictive Factor

OEF highlighted the challenges of operating in extremely austere environments. Rear Adm. James A. Robb, CENTCOM's Chief of Plans claimed, "the operation itself was right on the edge of the logistical envelope."[43] With essentially no surface routes available, all troops, equipment, and supplies had to arrive by air. The ability to conduct air refueling allows greater payload upon takeoff, increases aircraft range, and potentially reduces the needs for ground refueling at the destination. If refueling is not possible at the APOD, such as existed in Khandahar, Afghanistan, payloads have to be reduced or additional enroute stops required. At USTRANSCOM, action officers coined the phrase "A gas tank too far", to illustrate the frustration that fuel constraints placed on speed of force deployment and sustainment.[44]

A modern force has an insatiable appetite for fuel for its vehicles, airframes and generators. With no indigenous sources to draw from, OEF C-17s would "wet-wing" fuel by landing at Bagram, off-loading internal fuel into bladders on the ground, and then take off to hit the overhead tanker again.[45] Downloading fuel proved to be a new type of cargo mission that

initially drew resistance from Air Mobility Command planners and required a different paradigm. While the communications and coordination have been ironed out in practice, we as a joint force have yet to adequately address this critical requirement to sustain forces in contact.

The Marines were able to overcome fuel as a logistical hurdle through their own unique tailored assets. In support of Enduring Freedom, 1,400 sorties of Marine KC-130's delivered almost 7 million gallons of fuel along with cargo and sustainment into Khandahar, 500 miles from the nearest shore.[46] Movement of sustainment requirements deep inland to support operations in austere environments is an admirable capability that will continue to challenge the Army until we can leverage new tools.

Large scale analyses over the last decade focused on the capacity of the power projection system to support multiple, large-scale deployments, often in support of a MTW. Habitually, these have entailed deployments to North East Asia (Korean Peninsula, Taiwan Straight) or Southwest Asia (Persian Gulf) where there are robust destination infrastructures in place. While our military must always be prepared to fight our nation's wars, it is most likely that future expeditionary employments may involve something less than an MTW. The nature of expeditionary warfare combined with globalization and dwindling natural resources, stretches our national ability (or capability) to deploy to some of the more remote areas of the globe.

As the Department of Defense and the services adapt to the changing global environment through their transformation efforts, expeditionary operations will directly depend on effective integration of Army combat system development, deployment infrastructure and evolution of strategic lift platforms. The next section proposes exploitation and adaptation of current deployment alternatives and then examines prospective systems that hold great promise for effectively deploying the expeditionary force in future.

Proposed Strategic Mobility Alternatives

Strategic mobility is an integral part of DOD transformation. Mobility needs must be addressed in terms of improving the current force while looking forward to revolutionary throughput and capabilities. We also must maintain a sense of "bang for the buck" with development of new platforms in terms of timeframe, capability, risk and cost. The following sections examine alternatives that are 1) available for immediate consideration, and 2) system concepts requiring additional research and development for future needs.

Near Term Alternatives

The U.S. Air Force's C-130 Hercules has functioned as the tactical lift workhorse since the 1950's. The latest variant, the C-130J, offers some unique potential as an operational, if not

strategic lift platform. Maximum payload for the stretch variant is just under 24 tons.[47] The C-130J has a range of 3,700 nautical miles without external tanks, but its range can be further extended to strategic ranges through modifications for in-flight refueling. Every one of the 130 x C-130J's delivered to date (50 more in production)[48] have the requisite plumbing, however Air Force variants on which the Army depends do not have the final coupler.[49] Modification of C-130J's would bring a new capability to deliver expeditionary forces to smaller airfields across the globe. Full exploitation of these versatile aircraft would enable greater dispersion of embarkation sites, and reduce vulnerability to enemy A2/AD. Fort to end destination in a single aircraft also alleviates time-consuming transload operations from strategic to operational platforms. The C-130J with aerial refueling could cheaply boost the sustainment and delivery of lighter forces as well as augment C-17s in sustainment delivery over strategic distances, no longer burdened by fuel ranges. A future challenge remains in that the Army's Stryker vehicle pushes C-130 operational limits and the Future Combat System may bloat past the 20 ton specification as well.

A second proposal has been echoed by all of the mobility studies since the 1990's; the modernization needs of the C-5 Galaxy. The C-5 brings unique capability to the air cargo force by carrying twice as many pallet positions as the C-17, as well as opening at both ends and kneeling for rapid cargo offload.[50] In 2001, as the U.S. deployed forces from CONUS both east and west toward the U.S. Central Command Area of Responsibility, broken C-5's littered the air bridge in both directions, with airframes awaiting repair not only tying up critical cargo, but occupying scarce MOG real estate that slowed the deployment of forces and sustainment.[51] The mission capable rates for the C-5 airframe was a lackluster 60% in 2001[52], compounded by overdue upgrades to over half the fleet which came online in 1969.[53] The low readiness rates of the C-5 caused USTRANSCOM to outsource over 200 flights to commercial Russian AN-124 heavy lift aircraft in the two year period of 2003 and 2004.[54] Upgrading C-5As is long overdue, and modernizing the entire C-5 fleet of 120 aircraft provides the capacity of roughly 218 C-17s. While modernizing an old platform is expensive, it reduces the operational risk of depending on a homogenous fleet of C-17s. The MCS recommended C-5 reliability improvements, with an intended goal of extending the service life for an additional 25 years.[55]

Without question, the C-17 brings impressive capabilities to the joint warfight and is the strategic platform of the near-future. C-17s and C-5s throughput capability can be extended by development of bi-level cargo loading (double stacking). Many analysts have shown that platforms tend to run out of deck space before they bulk or weight out.[56] Double stacking increases cargo throughput without MOG constraints. Additionally, the C-17 program must

continue to upgrade Station Keeping Equipment follow-on to enhance capability for tighter formations and move closer to the 30 minute SBA drop requirement.[57]

The essential elements of the strategic mobility triad are airlift, sealift and pre-positioned stocks. Effective use and placement of pre-position stocks of equipment, supplies and munitions enhances agility by reducing the transportation requirement to theater. The difficulty for the services is defending the funding and maintenance for these mobile and forward positioned assets far from CONUS or outside an ongoing warfight. The MCS reiterated that afloat pre-positioning of equipment and supplies improves the promptness of cargo delivery and reduces requirements on the system.[58] Assuming that there will be sufficient seaport infrastructure in prospective theaters of operation, purchasing additional Large, Medium-Speed, Roll-on/Roll-off Ships (LMSR) adds vast capability to build and sustain forces. The current LMSR fleet maintained by the Military Sealift Command consists of eight pre-positioned equipment ships and eleven ships in Surge Sealift which are ordinarily kept in reduced operating status.[59] A recent Congressional Budget Office study shows that one of the most effective options to rapidly build combat power is through purchasing four additional brigade pre-positioned sets and basing them on additional LMSRs afloat.[60]

The benefit of pre-positioning logistics stocks and equipment afloat can not be overestimated. This is not just a matter of having the stocks, but making the strategic decision early enough to have an effect that encourages more cargo to be moved via surface rather than the dependency on air. In a recent instance of indecision and the air-centric associated costs, during the bombing campaign in Afghanistan in 2001, the Air Force stood on the verge of running short of precision guided munitions and 2000 lbs. bombs. The bombs and Joint Direct Attack Munition (JDAM) kits were flown to Diego Garcia from CONUS for several weeks before the Air Force decided to release one of its pre-positioned ammunition ships, the MV (Motor Vessel) Major Bernard L. Fisher. The need to fly these critical munitions as cargo bled throughput and airlift assets away from the transportation and deployment of other cargo.[61] In terms of the cost in delaying a modal transportation decision, a USTRANSCOM brief to the Defense Science Board in 2002 showed that moving 16 thousand JDAM to Diego Garcia by air cost $253 million, vice a surface deployment and utilization of pre-positioned stocks costing only $10.7 million.[62]

A look at near term alternatives and components to enhance expeditionary capability is incomplete without consideration of basing and Theater Security Cooperation (TSC). TSC is crucial as a way to ensure access throughout the global commons and key neighboring countries within the area of responsibility. This is not only apparent for ISB and transload

locations, but also for air tanker basing. All instruments of power must be applied to ensure access and throughput prior to the onset of a deployment by identifying locations for ISBs, air and sea ports as part of a strategic campaign plan.

Longer Term Alternatives

In order to gain transformational improvements in strategic mobility, the deployment mix calls for a platform with truly revolutionary capabilities. Instead of fixed-wing air transports with even larger (and less efficient) payloads, one such proposal that offers vast promise is heavy-lift hybrid airships. The Defense Advanced Research Projects Agency (DARPA) proposed developing a non-rigid hulled helium airship with a payload of 500 tons that can achieve an average speed of 100 knots. The proposals are "hybrid" in design as it balances static with dynamic lift, making it easier to control on the ground and in the air.[63] The DARPA Walrus concept vehicle would be capable of transporting 453 tons over 12,000 miles unrefueled in less than a week.[64] Such a vehicle eliminates transload and refueling at ISBs, and overcomes logistics chokepoints. The airship carries troops along with their equipment, reducing Reception, Staging and Onward Integration (RSOI) times and enables a fort to fight delivery. The airship can operate from numerous smaller airfields (even unimproved or improvised) giving it the ability to operate independently from large airbases around the world. Hybrid airships may require long runways for takeoff, but should be able to land at short destination airfields having consumed onboard fuel. They could then takeoff after delivering cargo almost vertically. According to Institute for Defense Analysis (IDA), heavy lift airships are feasible in the far term within 10 years.

As an example of how a heavy lift airship could have instantaneous impact on logistics sustainment, look to Operation Anaconda in early 2002. In order to sustain ground and air operations in Afghanistan targeting enemy forces in the Shah-i-Kot Valley, the Air Force conducted "wet wing" operations with C-17As (Block 16), transferring 193,000 gallons of fuel from over-flying tankers down to fuel bladders in Khandahar over six nights.[65] These high risk - high cost missions could have been fulfilled with a single Walrus, freeing up critical lift and MOG for direct combat support missions. Airships could have also alleviated the need to transload from C-5 and commercial aircraft into C-17s for the final legs into Afghanistan, causing slippage in execution of the Time Phased Force Deployment Data (TPFDD) schedule.[66]

Outstanding technical issues facing hybrid airship development include station keeping, altitude maintenance with fuel and cargo discharge, and survivability in a combat zone.[67]

Despite the revolutionary capabilities that hybrid airships could bring to expeditionary force deployment and sustainment, Congress cancelled funding for DARPA's Walrus concept early in 2006 without explanation.[68]

The Super Short Take-Off and Landing (SSTOL) Aircraft is a long term replacement concept for intra-theater lift and the C-130. With at least 50% greater cargo capacity, it is designed for landing on 1,000 feet unimproved fields and to carry the Army's Future Combat System in all configurations.[69] As with the GRT, risks due to high costs and unproven technologies could delay functional models for well over a decade.

If DOD can successfully develop more capable platforms that depend less on existing infrastructure, the operationalized swarm concept can be a means to defeat enemy A2/AD efforts.[70] The swarm uses net centric warfare and capitalizes on communication and situational awareness to mass firepower from omni-directional locations. In theory, effectively employed swarms enable mass at a decisive point and time on the battlefield, particularly when refueling needs can be reduced or eliminated.

Holistically, DOD future research and development must adequately consider decreasing energy consumption; which includes combat, sustainment and transport systems. If DOD is able to reduce its logistic tail, it should inherently extend ranges and feasible station time.

Conclusion

Under current parameters, deployment response can be improved by forward positioning forces overseas, by reducing the logistics tail through improved fuel efficiency and ranges, or by reducing the lift requirement by accepting a lighter force and/or accepting slower deployment. Without adequate airlift capability, expeditionary forces operating from strategic and operational distances may not be feasible without significant amounts of risk.[71] In the future, DOD must actively pursue emerging technologies in strategic and operational mobility as well as develop an integrated prepositioning strategy that fully accounts for the IGPBS-driven defense posture.

Effective deployment can function as a flexible deployment option in itself, precluding hostilities, or at least reducing risk should hostilities occur. The U.S. cannot always predict where on the planet deployments may be conducted, against what type of enemy, or any coalitions with which we may fight. While deployment and sustainment needs will likely vex future planners to come, this nation must continue to provide adequate platforms to project an expeditionary Army. We must ensure that integrated DOD force projection programs are able to achieve the Combatant Commander's force requirements, that the Joint Swiftness Objectives

(10-30-30) can be met across the global spectrum, and that we possess the capability to project ourselves into austere environments.

As an Army, an expeditionary mindset will be firmly inculcated throughout the force. Much as in the Marine Corps, expeditionary operations will not only become the initial consideration for operations, but will grow to be an essential tenet of Army culture. The Army and the nation's challenges are to provide the platforms, system and infrastructure to project the expeditionary force of today and the future.

Endnotes

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